laser resonator system **300** may be maintained or improved. For example, the energy ratio may be compared to an expected energy ratio associated with the laser resonator system **300**, and one or more components of the laser resonator system **300** may be adjusted to decrease a deviation between the energy ratio and the expected energy ratio. Additionally or in the alternative, components of the laser resonator system **300** may be controlled responsive to the energy of the forward beam transmission, the energy of the return beam transmission, or the energy ratio to reduce a possibility of damage to the laser resonator system **300**.

[0047] FIG. **4** illustrates a particular embodiment of a method of operation of a laser resonator system. In a particular embodiment, the method **400** may be performed by a controller, such as the controller **130** of FIGS. **1-2** or the controller **330** of FIG. **3**. The method **400** includes receiving, from a sensor of a laser resonator system, at least one output signal, at **402**. The at least one output signal may be based on an energy of a portion of a forward beam that is transmitted by a mirror of the laser resonator system and based on an energy of a portion of a return beam transmitted by the mirror.

[0048] For example, as illustrated in FIG. **1**, the at least one output signal may be received by the controller **130** from the sensor system **120**. The at least one output signal may correspond to an energy of the forward beam transmission received by the first sensor **122**, to an energy of the return beam transmission received by the second sensor **124**, to a ratio of the energy of the forward beam transmission to the energy of the return beam transmission (e.g., an energy ratio), or a combination thereof. The energy ratio may be compared to an expected energy ratio of the laser resonator system to determine a deviation between the energy ratio and the expected energy ratio.

[0049] The method **400** also includes, at **404**, controlling a component of the laser resonator system based on the at least one output signal. For example, controlling the component of the laser resonator system may include modifying an optical characteristic (e.g., an optical property) of one or more components along a forward optical path, a return optical path, or both, such that a power of a forward beam (e.g., a beam travelling along the forward optical path) or a return beam (e.g., a beam travelling along the return optical path) is modified. In this example, as illustrated in FIG. **1**, the controller **130** may control the control device **132** coupled to the secondary mirror **102**, the control device **134** coupled to the primary mirror **104**, one or more of the fold mirrors **108**, one or more of the active mirrors **106**, or a combination thereof. For example, the controller **130** may move the primary mirror **104** or the secondary mirror **102** based on the at least one output signal. As another example, the controller **130** may modify a pointing direction, a focal point, or a combination thereof, of the mirrors **102**, **104**, **106**, and **108** based on the at least one output signal. As another example, the controller **130** may control a power (or energy) of pump light provided by the pump light sources **110** based on the at least one output signal, which may reduce a temperature of the active mirrors **106** and reduce a possibility that the active mirrors **106** will undergo a temperature-induced shape change.

[0050] Accordingly, the method **400**, as performed by the controller **130** in conjunction with the sensors **122** and **124** of FIGS. **1-2** or the controller **330** in conjunction with the sensors **322** and **324** of FIG. **3**, provides a method for controlling a laser resonator system to maintain or increase efficiency of the laser resonating system. For example, based on the at least one output signal, the controller may compare, in real-time, a sampled energy ratio to an expected energy ratio and may control components of the laser resonator system to reduce deviation between the sampled energy ratio and the expected energy ratio. Reducing the deviation between energy ratios may increase the performance and the efficiency of the laser resonating system. Additionally, the method **400** may enable the controller to reduce a possibility of damage to the laser resonator system. For example, the controller may reduce the power (e.g., energy) of pump light provided by the pump output sources to decrease a temperature of components of the laser resonator system. As another example, the controller may shut down the laser resonator system if the deviation between the sampled energy ratio and the expected energy ratio exceeds a threshold value.

[0051] The method **400** of FIG. **4** may be initiated or controlled by a field-programmable gate array (FPGA) device, an application-specific integrated circuit (ASIC), a processing unit, such as a central processing unit (CPU), a digital signal processor (DSP), a controller, another hardware device, a firmware device, or any combination thereof. As an example, the method **400** of FIG. **4** may be initiated or controlled by one or more processors executing code (e.g., instructions stored in a memory device).

[0052] FIG. **5** is a block diagram of a computing environment **500** including a computing device **510** operable to control a laser resonator system. For example, the computing device **510** may be included within or correspond to the controller **130** of FIGS. **1-2** or the controller **330** of FIG. **3**.

[0053] The computing device **510** may include at least one processor **520**. Within the computing device **510**, the at least one processor **520** may communicate with a system memory **530**, one or more storage devices **540**, one or more input/output interfaces **550**, one or more communications interfaces **560**, or a combination thereof.

[0054] The system memory **530** may include volatile memory devices (e.g., random access memory (RAM) devices), nonvolatile memory devices (e.g., read-only memory (ROM) devices, programmable read-only memory, and flash memory), or both. The system memory **530** may include an operating system **532**, which may include a basic input/output system for booting the computing device **510** as well as a full operating system to enable the computing device **510** to interact with users, other programs, and other devices. The system memory **530** may also include one or more applications (e.g., instructions) **534** and program data **536**. The program data **536** may include data used by the applications **534** to perform respective functions of the applications **534**. The applications **534** may include instructions executable by the at least one processor **520** to operate or control a laser resonator system, such as the laser resonator system **100** of FIG. **1**, the laser resonator system **200** of FIG. **2**, or the laser resonator system **300** of FIG. **3**.

[0055] The one or more storage devices **540** may include nonvolatile storage devices, such as magnetic disks, optical disks, or flash memory devices. The storage devices **540** may include both removable and non-removable memory devices. In a particular embodiment, the storage devices **540** may be configured to store the operating system **532**, the applications **534**, the program data **536**, or a combination thereof. The system memory **530** and the storage devices **540** are physical devices and are not a signal.